Tools for Science

- **Tools for Collaborative Science**
  - **People-Related Tools**
    - **Collaboration Systems**
      - Management of Collaboration
      - Collaborative Exploitation of Facilities
        - Person-Person Interaction
        - Remote Steering or Control
        - Remote Instrumentation and Monitoring
  - **Data-Related Tools**
    - **Data Management**
      - **Scale and Geography Challenges**
        - Extreme Scale
        - Curation
        - XLDB Distributed / Parallel Queries
        - Indexing
        - I/O
          - Abstraction, Automation
        - Distributed Data
          - Productize Existing Tools
          - High Performance
          - Seamless Access
      - **Content Challenges**
        - Heterogeneous, Multidisciplinary
          - Curation
        - Self Describing Data
        - Provenance
          - Automated Capture
  - **Processing-Related Tools**
    - **Visualization**
      - 3D and nD Data
      - Semi-automated Segmentation and Feature Extraction
      - Multi-viz User Interfaces
    - **Workflow**
      - Experiment Frameworks
    - **Software Design and Coding**
      - Efficient execution hiding n*CPU, GPU etc. Architecture
    - **Distributed Processing**
      - Exploit Advanced Networking
        - Usability Scalability Universality Function
      - Monitoring and Forensics
        - User Accessible
      - Identity and Security
        - Secure Federation
        - Virtual Private Labs for Extreme Science
        - Usability
      - Optimization
        - Location of Processing and Data
        - Power Consumption
        - Sharing and Co-scheduling
    - **Cyber Infrastructure**
      - Function and Usability
      - Scalability and Robustness
      - Cloud Integration

Legend:
- Specific to Collaboration
- Mainly Collaboration
- Some Collaboration
- Mainly not specific to Collaboration
- Not Specific to Collaboration